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# TRAUMA IN BIOCULTURAL PERSPECTIVE: PAST, PRESENT AND FUTURE WORK IN BRITAIN

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## INTRODUCTION

'Investigation of injury morbidity and mortality facilitates the assessment of environmental, cultural and social influences on behavior' (p. 9).[1] The aims of this chapter are to review the types of information that are potentially retrievable from a study of trauma in antiquity, and summarize the range of published research already extant on trauma. Further, it seeks to document the range and quality of work already completed on British material, and to recommend the way forward and best practice. It will not be possible to include all aspects of trauma but the more common approaches will be considered. Emphasis is placed on the study of both biological (skeletal) evidence for trauma, and the cultural context from which it is derived (i.e. the biocultural approach).

A holistic approach to studying any health problem is recommended, i.e. consideration of multiple forms of evidence to reconstruct health and disease patterning. While much of the emphasis in the study of trauma in British contexts has been on individual case studies, in North America the 'population-based biocultural approach' has been developed. If palaeopathological study in Britain is to advance, this latter approach is recommended.

## BACKGROUND

Trauma can be defined as any bodily injury or wound, and it may affect bone, soft tissue, or both.[2] Fractures are the result of any traumatic event that leads to a complete or partial break in the continuity of bone. Trauma covers many different areas and, as such, is commonly seen in archaeologically derived human skeletal material along with joint and dental disease. Of course, trauma may also affect only the soft tissues and will not, therefore, necessarily be observed in the skeleton. In addition, traumatic lesions may be so long-standing that the evidence could have been remodelled away before the person died, e.g. a fracture in childhood may be invisible by adulthood.

Trauma is regularly reported in skeletal material and can potentially provide data on a variety of aspects of past population behaviour. Some areas to be considered include domestic accidents (which may reflect physical environment and, for example, the climate), interpersonal violence (which may reflect sedentism, competition for resources, social inequalities and complexity, and increased trade and contact), and occupationally related trauma (e.g. environments and their effects on lifestyle). In addition, subsistence strategy (hunter-gathering versus agriculture), male and female differences, availability of treatment and nutritional status at the time of the fracture and throughout the healing phase (indicated by the end result of the healing process), are also areas of potential study with respect to occurrence and patterning of trauma. While, in general, the vast majority of work in palaeopathology has concentrated on injuries resulting from interpersonal violence, there is also research published on less dramatic lesions.

Trauma can be classified into four categories:[3] a partial or complete break in a bone (fracture), abnormal displacement or dislocation of a bone, disruption of nerve or blood supply (which may be a complication of a fracture), and artificially induced abnormal shape or contour (e.g. artificial deformation of the head). For the purposes of this chapter fractures and dislocations to the post-cranial skeleton will be considered, as the majority of injuries to the head and neck region are due to intra- and intergroup violence rather than accidental injury, and are covered elsewhere (see Boylston, chapter 22, in this volume). In addition, the evidence for trauma in the form of amputation and trepanation will be considered, as well as the treatment of post-cranial fractures; decapitation, scalping, weapon and soft tissue injuries, cannibalism and dental trauma are beyond the scope here.

## PREVIOUS WORK

Many excellent books, chapters, and major review articles have been written on trauma in antiquity,[1–8] their content ranging from very clinically based diagnostic approaches, to bioculturally interpretative considerations. Perhaps most work published in trauma has tended to consist of the 'case study',[9,10] or focus on trauma to particular parts of the body.[11] While interesting in themselves, they do not necessarily contribute to reconstructions of trauma patterning through time, although collectively considered they are helpful. Rarely have researchers dealt with issues of gender, status or economic, geographic or chronological differences in trauma patterns on a large scale (although see Cohen and Armelagos[12] on hunter-gatherer/agricultural differences, see Grimm[13] on gender differences, and see Angel[14] on chronological change in Greece). Other papers have contributed studies on developing a methodology for recording fractures in archaeological material,[2,15–18] while some have concentrated on treatment of trauma.[17,19–22] There is a lack of population studies of trauma patterning and prevalence, although over the past few years more have been published,[1,15,16,23–25] which describe very useful bioculturally relevant population studies. While trauma is common and easily recognizable in the archaeological record, and can potentially inform us of many aspects of past human behaviour, this potential has sadly not been exploited fully in published literature worldwide. As has been stated, 'The sparseness of a population perspective in this literature, however, precludes the realisation of the enormous potential that these kinds of data have for drawing inferences about human behaviour and conflict in earlier societies'[1] (p. 109).

## FRACTURES: A GUIDE

There is a considerable literature reviewing this subject.[26–29] Acute injury, repeated stress or an underlying weakness (e.g. osteoporosis in the spine) may induce fractures, but it is acute injury that constitutes the major cause. In addition, fractures may be closed (simple) or open (compound). Compound fractures mean that the fractured bone is exposed to microorganisms infiltrating the fracture site and causing infection, an obvious danger in antiquity without the availability of antibiotics for treatment. In addition, there are many types of fractures that are caused by varying forces. Some are named after the person who originally described them, some are named after occupations that commonly cause them, some names reflect the anatomical part affected, and some indicate the causative force.[6] For example, oblique and spiral fractures are caused by indirect/torsional forces, and transverse fractures by direct force. Comminuted (in many pieces) fractures tend to be associated today with high-impact road traffic accidents, greenstick fractures are seen in young individuals where the bones are malleable and do not break completely, and an impacted fracture results when the two fractured ends are driven into each other. Traction/avulsion fractures are when a fragment of bone is detached due to a sudden contraction of a muscle associated with a bone, and a compression fracture (usually in a vertebra) is the result of compression forces running through the bone(s). These fracture types have been illustrated previously,[7] but a particular problem to note with compression fractures in the spine is their differential diagnoses (Figures 1–3). Specific causes of fractures in archaeological contexts may be hard to identify. However, it is known that particular fractures occur more commonly in some circumstances, for example falls on an outstretched hand often lead to Colles' fractures of the wrist, i.e. an acute injury.

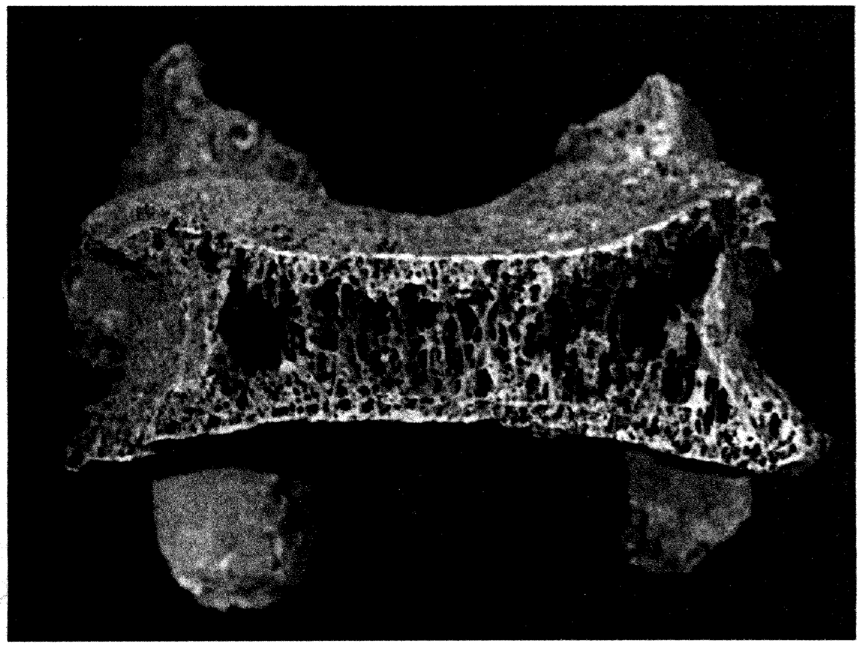

***Figure 1*** – Osteoporosis underlying a vertebral compression fracture (Romano-British).

*Figure 2* – Compression fractures in vertebral bodies as a result of trauma – no underlying pathology (Romano-British).

In archaeological contexts fractures observed are usually healed, indicating that the bone has undergone the first two stages of the healing process (circulatory/cellular and metabolic) and is into the final (and longest) mechanical phase. In this phase the bone (or bone cells, osteoblasts and osteoclasts) is gradually remodelled back to its normal anatomical shape. There are, naturally, many factors that affect the rate and efficiency of healing, and these include the fracture type and the bone affected. For example, arm fractures heal faster than leg fractures in clinical contexts but it should be remembered that availability of treatment will have an effect on this, for example forearm fractures often need internal fixation, something not readily available in the past. Other factors that may affect the healing process are the age of the person (the young heal faster than the old), whether the fracture has been treated, the presence of infection or other disease, the blood supply to the affected part and the person's diet. Some of these factors may be identifiable in skeletal material or known about the sample under study, but some will not, yet all must be considered with respect to fractures in past human groups. Of course, complications of fractures are many and some have been recorded in archaeological contexts (e.g. non-union[30]). In clinical contexts, infection, shortening and/or angulation of a limb due to a poorly reduced fracture (with or

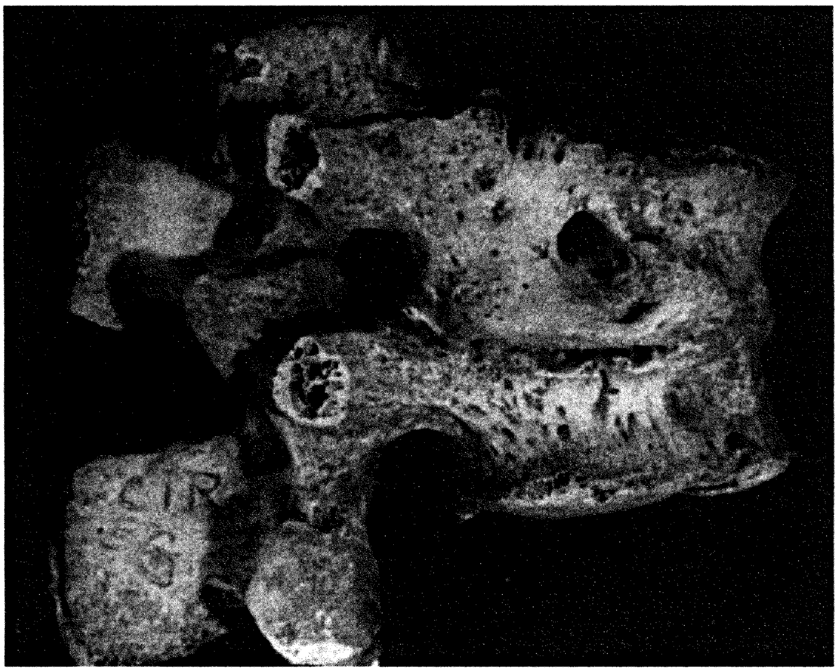

*Figure 3* – Compression fractures of lumbar vertebrae due to underlying infection (Romano-British).

without associated osteoarthritis of adjacent joints), death of bone due to severing of blood supply, blood vessel or nerve damage, pseudoarthrosis, and myositis ossificans (ossification of damaged muscle tissue) are the most common. In archaeological contexts there has only rarely been systematic documentation of fracture complications.

In clinical contexts trauma is well documented, and it is from there that information on types of fractures, their causes, complications and healing rates is usually accessed by people working on the palaeopathology of trauma.[26–29,31–33] It is generally easy to apply the principles for studying fractures in modern populations to the dead, although the factors inherent in the aetiology of fractures have changed through time so care must be taken in using some of these data. For example, comparative data from traditional agricultural communities with no access to modern technology do exist and have been used, and these are more appropriate for archaeologically based studies.[34] Furthermore, there is an equal or greater number of papers covering a range of areas in modern fracture studies that can be used as comparative data,[35] although with modern studies the whole patient is being observed and not just fragments (as in an archaeological context).

## STUDIES OF TRAUMA IN ARCHAEOLOGICALLY DERIVED SKELETAL MATERIAL

Archaeological studies of trauma range from the case study to the biocultural approach to fracture patterning. For example, individual case studies have been used to investigate prevalence rates of fractures from the 7th millennium BC to the 2nd century AD in Greece.[14] However, population based studies of chronological trends in fractures are rare. A different approach, looking in detail at fractures in a particular sample, was undertaken on skeletal material from Ohio, North America[36] and, although focusing on one medieval population in England, a comparative study of fracture patterns with five other sites of the same period has also been made.[15] A recent issue of a journal in the field, although dealing with issues of trauma in archaeologically derived human remains, was somewhat disappointing in that most papers failed to deliver a truly biocultural approach to trauma patterning, with real fracture prevalence rates.[37]

A survey of trauma reported in published and unpublished skeletal reports from Britain also displays a disappointing amount of useful data; many reports do not describe trauma by actual prevalence rate. It indicates that there are three classes of trauma data in skeletal reports. Some describe fractures by individuals affected with no bone counts available to determine *actual* prevalence rate[38–44] (this assumes all bones for all people were available for examination). Others describe fractures by individuals *and* by bones affected, with[45,46] or without[47] bone counts. Finally, some provide data on individuals affected and bones affected but do not discuss *actual* prevalence rates for each bone, although bone counts are available (i.e. the reader can calculate this using the data provided).[48–52] There clearly needs to be greater consistency in reporting.

Special fractures include the clay shoveller's fracture of the seventh cervical and first thoracic vertebrae, and spondylolysis (detachment of the neural arch at the pars interarticularis), usually of the fifth lumbar vertebra.[53] The latter is more commonly reported than the former, although both are seen in British material.[54,55] Both conditions may be directly related to activity (stress and strain) and need more study. In addition, attention has recently been drawn to the skeletal evidence for child abuse in the form of both fractures at specific sites in the body and periosteal new bone formation on certain bones of the skeleton.[56] Child abuse, and also torture (described in the forensic literature as consisting of mainly soft tissue injuries and possible amputation of parts such as fingers[57]) are frequently described in the media today but are rarely considered in the past. Having so much modern data on these two aspects of human behaviour means that a study in the past potentially has some comparative base, and this is another area that could be considered with respect to British archaeologically derived skeletal material.

Some other traumatically induced conditions reported very occasionally in British material include slipped femoral epiphysis,[58] and dislocation.[59] Similar conditions are also reported from outside Britain.[60–62] The loss of contact between two bones at a joint (dislocation), usually of the hip or the shoulder (which may be either congenitally, traumatically or disease induced) is recognizable only if the bones stay out of alignment for long enough for another joint surface to be created, or if characteristic fractures in peri-articular bone are present,[29] or other related lesions.[63] It is possible, as today, that some dislocations may have eventually naturally reduced themselves.[7]

## TREATMENT OF TRAUMA

Arising from a study of trauma is the question of whether, and how, people in the past cared for those who suffered trauma. Trauma, like any other health problem (as today), may have prevented a person from functioning 'normally' within their community. Therefore, care and treatment are likely to have been sought, and communities would have gradually developed care systems. The abundant evidence for beliefs and concepts of disease, diagnosis of disease, anatomical knowledge and its relevance to treatment, and treatment in a general sense in past and contemporary traditional societies, is beyond the scope of this paper; however, there is some evidence of direct treatment of traumatic lesions.

## Fractures

Historical, iconographic and ethnographic sources suggest that there was knowledge of how to treat fractures in the past,[64–67] and traditional living populations today also have systems and knowledge for dealing with trauma.[68] Occasionally there is also direct evidence,[69] but there has been little attention paid to determining whether documented knowledge can be displayed in the skeletal evidence for trauma. Correlating evidence and efficiency in healing of long bone fractures with contemporary historical data is possible in some British material but, with some exceptions[2,15–17,21], little attempt has been made to do this worldwide. Although some researchers make comments on how well fractures have healed and whether there may have been therapeutic intervention, few take the data any further, something which should be of interest to biological anthropologists. Figures 4 and 5 illustrate two tibial fractures from different Anglo-Saxon sites which reveal very different healing; does this reflect the availability or not of treatment in different populations?

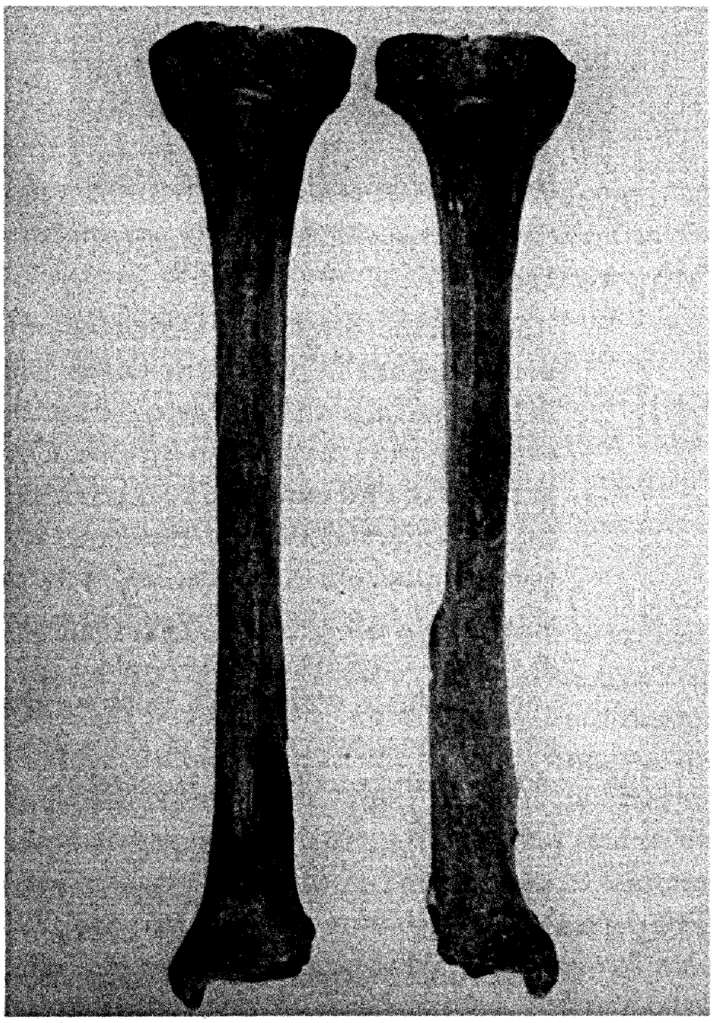

***Figure 4*** – Fractured right tibia (Anglo-Saxon) with normal left tibia for comparison. Healing is good with no angulation, overlap or lack of apposition; this suggests possible treatment.

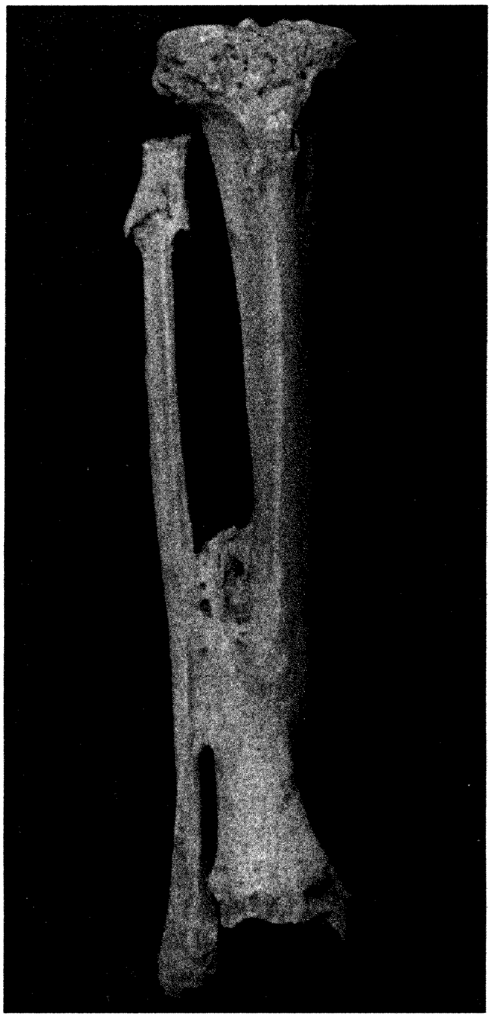

*Figure 5* – Fractures to tibia and fibula (Anglo-Saxon). There is overlap and lack of apposition of the broken ends; this suggests lack of treatment.

## Amputation

Amputations (surgical/accidental) of limbs may be classified as fractures and may have been performed as a result of complications of a severe fracture. They have also been described in historical literature and depicted artistically; rarely, however, are they described in skeletal evidence, and examples almost always have evidence of healing.[19,70–73] This arises from the problem of differentiating between unhealed peri-mortem (sustained shortly before or at the time of death) and post-mortem fractures. It is highly probable that many people undergoing amputation in the past died at the time of the operation, probably from blood loss and shock, and therefore there would be no evidence of healing on the amputated bone. Clearly, as seen in illustrations, people did undergo amputations and were provided with crutches and prostheses with which to move around post-operatively.[74] When recording possible amputations, examination of the edges of the cut is essential to prevent over-diagnosis, although the problem of 'weathering' of peri-mortem cut edges post-mortem must be considered.

## Trepanation

Trepanations (which cover all surgically induced holes in the skull) or trephinations (which describe only holes made by a trephine or drill) are the surgical removal of a piece of bone from the skull and are also a form of treatment. They can also be classified as fractures and their history goes back into the prehistoric period where successful examples are apparent (i.e. the person survived the operation). Many reviews have been published of this remarkable operation.[1,3,4,6–8,75–77] While some cases are associated with head injuries,[20,78] others do not have any indication of why the trepanation was done, although headaches, migraine and epilepsy are claimed to have been treated using trepanation in the past. Trepanations have been documented around the world from all periods[79,80] and have been described and documented historically.[4,67] In British contexts, a prime researcher in the art of, and evidence for, trepanation was Parry[81] but later researchers have also contributed to the collective evidence for trepanation in Britain.[22,82,83] While there are many different types of trepanation (scrape, saw, bore and saw, gouge and drill), it was the more controllable scraping method that seems to have been used the most in British contexts, and it was also the one that appeared to heal, i.e. the person survived the operation. However, in the past, the risk of infection being introduced into the brain tissue via the operation must have been high, and it is likely that cerebral infection post-operatively would have led to the death of the unfortunate individual. When recording trepanations, in addition to the site of operation, type of trepanation, and characteristics of the edges of the opening, it is advisable to note any evidence of infection around the site. Of course the possibility that holes in the skull may be post-mortem must be ruled out by considering the characteristics of the edges of the hole. In addition, the consideration of the many differential diagnoses for holes in the skull should be considered, e.g. enlarged parietal foramina and neoplastic disease.[8]

## LIMITATIONS OF THE DATA

The limitations of studying fractures in the past need some discussion. As for any other pathological condition, it is preferable to have the whole skeleton for study so that fracture patterning can be observed. For example, if one of the forearm or lower leg bones is fractured, observation of the other bone (and the opposite side to gain an impression of the level of deformity on healing) helps with interpretation. It is particularly important to look at fracture patterning, as in certain circumstances one may expect to see fractures occurring in specific parts of the body as a result of a particular traumatic incident. For example, interpersonal violence may result in head (especially the face), neck and forearm injuries.[84] However, forearm (parry) fractures alone do not necessarily mean interpersonal violence as they can be caused by falls.

Many people publish data on fractures with reference to age at death but it is virtually impossible to ascertain when a person sustained a fracture in life once the fracture is healed; was it 1, 5 or 10 years before death? It is only if the fracture is in the early stages of healing that age at death is directly relevant (of course, the older you are the more fractures you are likely to have sustained, as for any pathological condition). Very few fractures are observed in non-adults recovered from archaeological contexts, even though it is likely that in the past, as today, childhood fractures were a common occurrence. This absence of fractures seen in the young is probably because the skeleton is rapidly growing and if a bone is fractured then the fracture will heal quickly and even become invisible when viewed radiographically. However, the observation of bowing of bones both in adult and non-adult skeletons,[85] or shortened but normal-looking bones, may indicate old fractures. It is, however, interesting to note reports of accidents in children documented in historical data,[86] and it is probably here that more data on trauma (and other health problems) in children may be gleaned. Looking at typical childhood fractures in adult skeletal material may also provide clues to data for the younger part of the population. For example, fractures in the elbow region are common in children but rare in adults,[26] but fractures of the scaphoid and femur neck are uncommon in children. In addition, fractures to the distal radius (Colles' fractures) are the commonest fracture today in people > 40 years, especially females.[26] Observation of the bone elements affected in relation to age may aid us in identifying fracture occurrence in the growing years, even if the hard evidence is unavailable.

As all bones are not radiographed in palaeopathological work, very well healed fractures will not be detected. Recently sustained (peri-mortem) fractures are difficult to identify archaeologically because no healing has taken place. Even taking into account the particular fracture patterning determined by the characteristics of 'fresh' as opposed to archaeological bone[4] can be potentially misleading, as post-mortem breaks occurring while the bone still retains its highly collagenous 'fresh' composition would display similar fracture patterning and colouration to peri-mortem fractures. Also, a problem in identification may arise if the edges of a peri-mortem fracture have been weathered due to burial in the ground. Finally, stress induced fractures may also be hard to identify because they are often manifest as hairline fractures and, even if radiographed, they may not be obvious; tibiae, fibulae and metatarsals are the commonest bones affected.[26] Despite these limitations, there is a wealth of evidence available from a study of trauma.

## RECOMMENDATIONS FOR RECORDING FRACTURES

Recommendations for recording fractures should follow published guidelines[17,18] with additional data,[87] according to the question being asked of the material. The initial, general and detailed description of the injury is the pre-requisite for more detailed work (Table 1). There are certain features that should always be recorded. These include fracture position using anatomical terms and type of fracture (e.g. is there any underlying pathology). In addition, the state of healing and any associated deformity, such as apposition, overlap, linear or rotational deformity (describe the distal fragment in relation to the proximal), and infection or joint degeneration (assuming these occur after the fracture and not before, and thus are complications) should be noted. Looking at the types of fracture and bone fractured, and comparing that information with clinical data may give an insight into treatment in the past. For example, forearm fractures and femoral shaft fractures often lead to considerable deformity and need either internal fixation and/or considerable traction to treat them. In archaeological contexts poorly aligned forearm and femoral fractures are recognized, perhaps indicating problems with treatment (Figure 6), but occasionally good results are seen which may reflect either careful and effective therapy or just good luck (Figure 7). Detailed descriptions of the state of healing of the fracture observed may reveal definite healing, non-union or non-union due to the person dying before union could take place. Figures 8 and 9 show examples of what the author believes to be clear non-union, and non-union due to healing being halted by death.

***Table 1*** – Fracture recording (macroscopic): features to note.

| | |
|---|---|
| 1 | Age and sex of individual |
| 2 | Bone affected |
| 3 | Side affected |
| 4 | Fracture position (proximal, mid, distal for a long bone, for example; use anatomical terms) |
| 5 | Fracture type[7] |
| 6 | State of healing (healed, unhealed, healing, woven/lamellar/mixed bone) |
| 7 | Evidence of infection (pitting, new bone formation, osteomyelitis) |
| 8 | Evidence of underlying pathology |
| 9 | Evidence of joint degeneration in adjacent joints |
| 10 | Evidence of linear/rotational deformity in degrees (measure on radiograph[15]) |
| 11 | Amount of overlap/apposition in millimetres (measure on radiograph[15]) |
| 12 | Alignment of bone (consider features 10 and 11) |

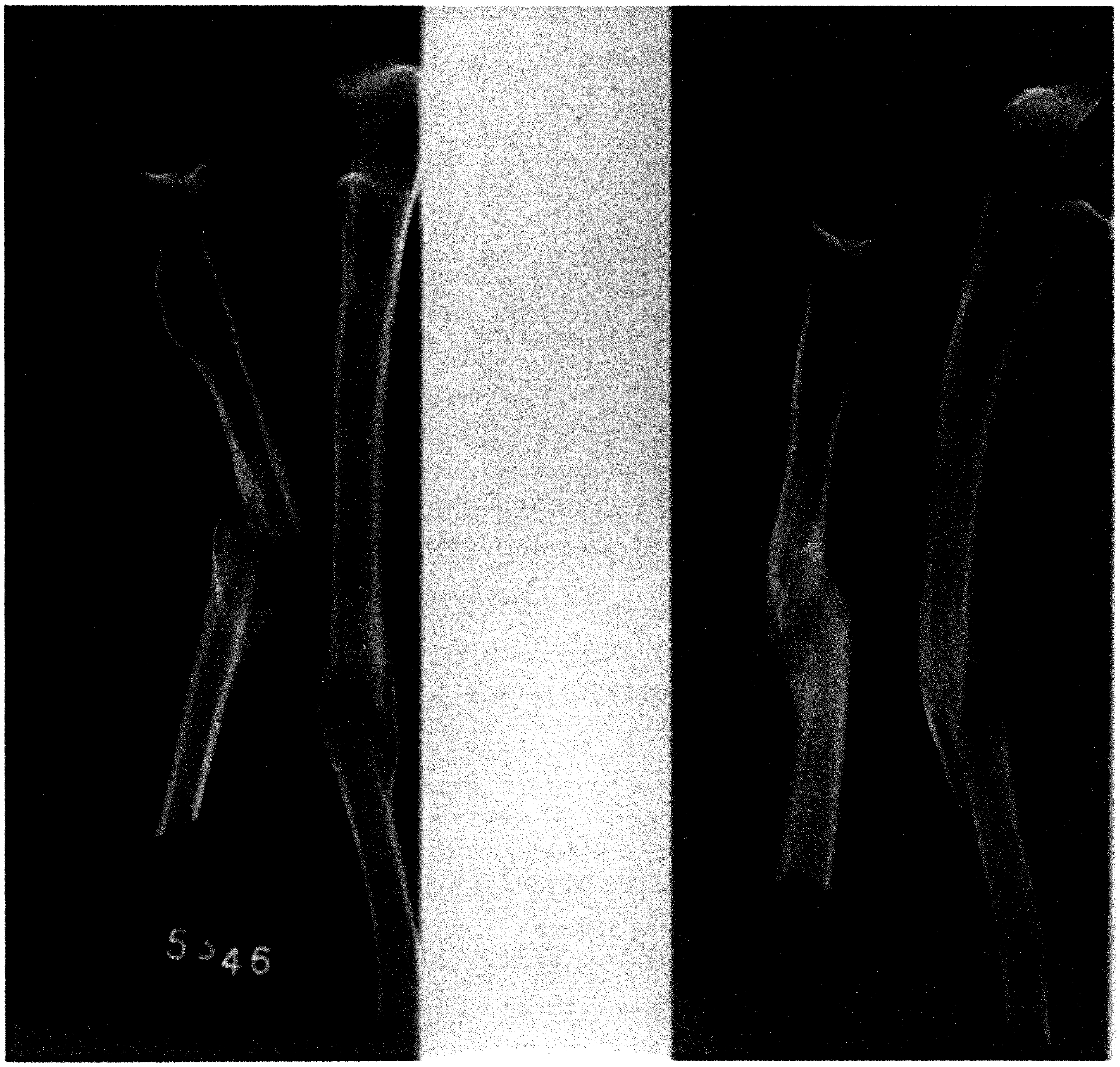

***Figure 6*** – Poorly aligned forearm fractures (later medieval).

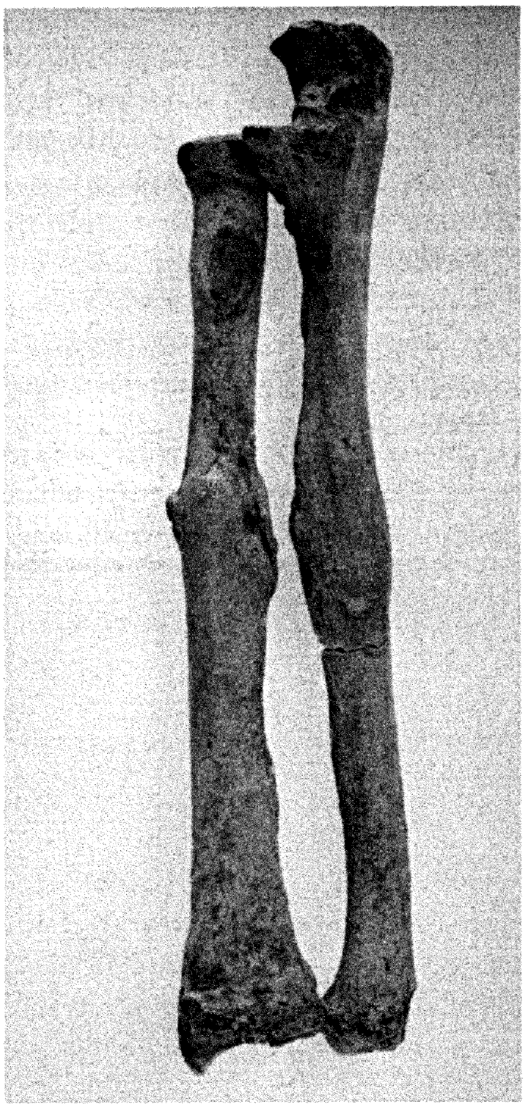

***Figure 7*** – Well-aligned forearm fractures (post-medieval).

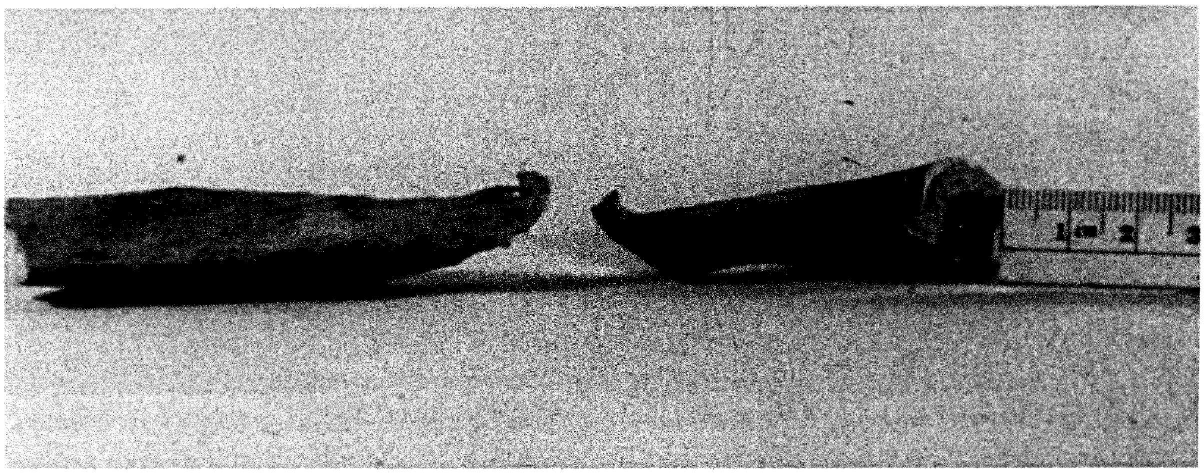

***Figure 8*** – Non-union of ulna fracture (California, USA).

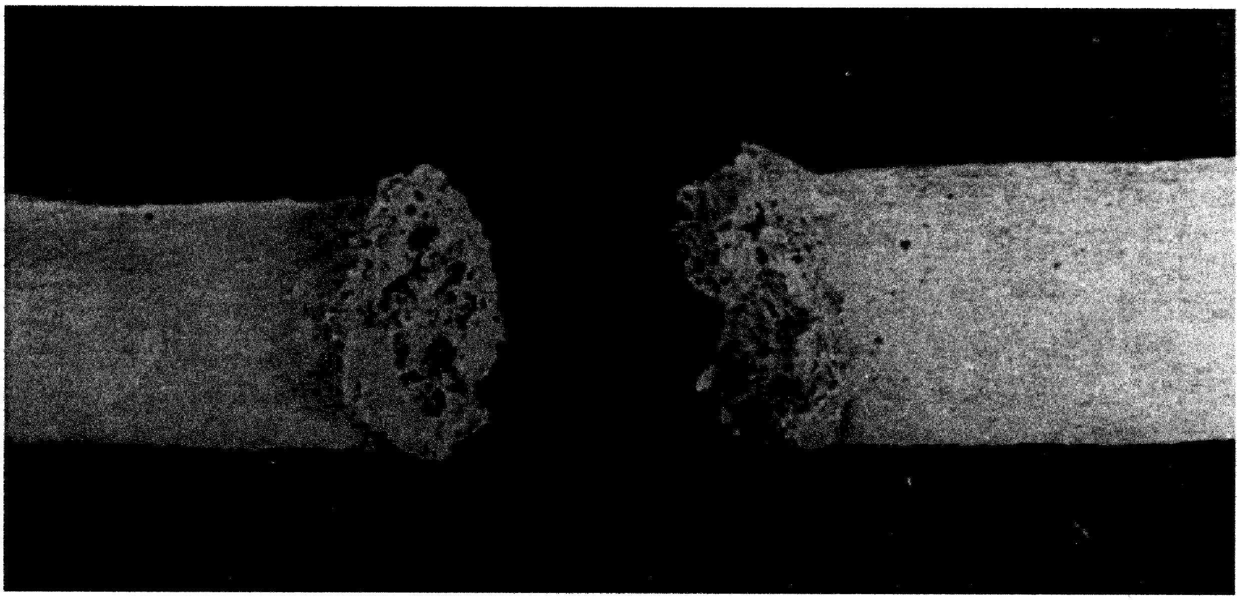

***Figure 9*** – Non-union of rib fracture, probably due to premature death of the individual – note bone formation at ends (Romano-British).

In addition to macroscopic recording, a radiograph of the fracture should be taken (minimum of two views, antero-posterior and medio-lateral). This aids in collecting the previously described data (particularly state of healing and deformity). For example, the actual type of fracture may not be obvious macroscopically, and the state of healing becomes more visible with a radiograph (e.g. is the fracture line visible?). In addition, measurements of overlap, apposition and linear deformity are most accurately measured on a radiograph,[15] and pseudopathological features visualized and noted. The radiography of trauma, of course, is documented in many excellent texts,[32] which aid in interpretation of archaeological material. Features of the radiographic picture should also be recorded (Table 2).

***Table 2*** – Fracture recording (radiographic): additional features to note.

| | |
|---|---|
| 1 | X-ray view taken: antero-posterior, medio-lateral, etc. |
| 2 | Fracture type;[7] may be different from that observed macroscopically |
| 3 | Visibility of fracture line (clearly visible, partially obliterated, totally obliterated) |
| 4 | Is there cortical and cancellous continuity? (links to features 3 and 5) |
| 5 | State of healing; is the bone formed opaque (more recent) or translucent (older and remodelled)? – links to features 3 and 4 |
| 6 | Evidence of shortening of affected limb (if long bone): measure on radiograph and compare with opposite side |
| 7 | Evidence of infection (new bone formation, osteomyelitis) |
| 8 | Evidence of underlying pathology (e.g. osteoporosis, neoplastic disease) |
| 9 | Evidence of joint degeneration in adjacent joints (e.g. subchondral cysts) |
| 10 | Evidence of linear/rotational deformity (measure linear on radiograph) |
| 11 | Amount of overlap/apposition of bone fragments (measure on radiograph) |
| 12 | Alignment of bone |

The most important point to note is that, as for any other pathological lesions in skeletal remains, the total number of bones present for observation for the population sample under consideration should be known so that *actual* prevalence rates can be calculated. Both individuals affected, and bones affected as a percentage of bones should be recorded.[15] Additionally, the portion of the bone present needs to be noted. For example, if Colles' fractures are being recorded, the number of distal radii present is needed to determine prevalence rates. This means that if the original basic data exists for a population then comparisons can be made between groups.[15] Finally, of course, the patterning of trauma should be considered by age, sex and status, and in socio-cultural environmental context which will aid considerably in interpretation; in British contexts there is also an abundance of contemporary historical data for later periods with which to interpret patterns of trauma. The value of the recording system described has been illustrated already and shows the detailed information retrievable from the data recorded about fracture patterning in populations.[15–18]

While the emphasis here is on how to record and interpret fracture data, in the UK (and elsewhere) emphasis must be placed on better cooperation between biological anthropologists and archaeologists, both on and off site. Careful excavation and recovery of all bones,[88] and meticulous informed processing of material, with detailed recording on site, can contribute significantly to the final interpretation of a sample population's trauma patterns. For example, good clear photographs of skeletons *in situ* may give an indication of trauma complications that will probably not be evident once the skeleton has been removed from the ground. Figure 10 shows an individual who had sustained a femoral neck fracture and clearly had a shortened leg. In addition, purely by accurate recording of the skeleton in the ground, fracture complications such as nerve or blood vessel disruption may be revealed. In the case of a supracondylar fracture to the humerus, for example, injury to the brachial artery can occur with Volkmann's ischaemic contracture. Here there can be replacement of affected muscles by fibrous tissue and contracture of the wrists and fingers into flexion; sensory and motor paralysis of the hand can also occur.[26] Flexion contracture may only be recognized in the burial context, although lesions to the phalanges of the hand may be apparent (also seen in leprosy[89]). Loss of function as a result of trauma may also be revealed in the presence of osteoporosis or atrophy of the affected limb.

Most people working on trauma will only have access to macroscopic and radiographic techniques for recording, but there has been some work using more sophisticated methods of analysis. For example, there are problems of diagnosing osteoporosis in archaeological material because of post-mortem changes in bone leading to loss of bone mass. In such cases, the study of microfractures using scanning electron microscopy (SEM) may potentially provide information about osteoporotic fractures in the spine, wrist and hip, as microfractures can occur in osteoporotic bones.[90] It should not be forgotten that microfractures can also occur in bones subject to stress in young adults. Furthermore, computed tomography (CT), i.e. taking cross-sectional images at 1.5–10 mm intervals of a subject, be it of a bone or a body, has been little used in the investigation of trauma (but see Notman[91] for use of this method on identification of rib fractures in a mummy). The identification of non-adult, well healed fractures and stress fractures using CT, and the microscopic evaluation of the surfaces of possible peri-mortem fractures using SEM, may help to solve some of the limitations of trauma study outlined above.

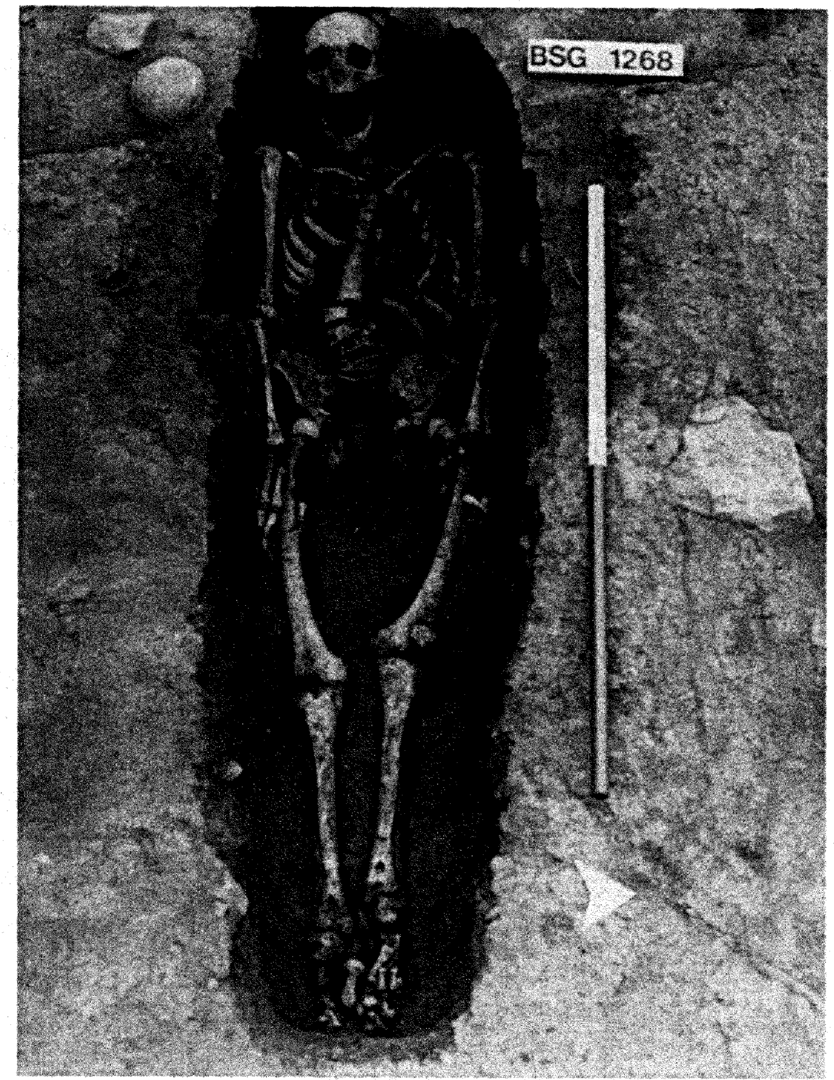


***Figure 10*** – Skeleton from St Giles by Brompton Bridge, North Yorkshire.

## CONCLUSIONS

Clearly there is much to be gained from a study of trauma. However, and not only in British contexts, there needs to be more concentration on the population and not the 'individual' in the future rather than a further proliferation of interesting cases of trauma. In this way more meaningful information about patterns of trauma (and its treatment) may be gained. In Britain, as there has been so little work done at a population level, gaps in knowledge are large and therefore we are only just beginning. Some points need emphasizing for future work in this field:

- Population studies are of prime importance, with a stated hypothesis to test.
- Prevalence rates as a percentage of bones available for study, plus people (individuals) affected, must be stated in any report, or at least data provided to do these calculations.
- Detailed descriptions of traumatic lesions are essential. For fractures interpretations should work from a clinical base, and anatomical position, state of healing, and complications evident, with radiographic supporting evidence, are needed.
- Prevalence rates by age, sex, and status are required, where possible.
- Trauma needs to be considered chronologically and geographically.

- Data should to be interpreted with reference to both the cultural and funerary context. For example, are there differences in trauma between urban and rural, and monastic and lay populations, and are the fractures better healed in a hospital as opposed to non-hospital context?
- Sample representivity must be considered (i.e. is it biased?). For example, if a battlefield cemetery were being considered then many fractures (probably many unhealed) would be expected compared with a general cemetery, and a preponderance of males is also likely.
- Is there any evidence for treatment? For example, are the bones well aligned and healed? Is there contemporary evidence for the period for treatment of fractures?
- Case studies need collating for British contexts.
- Data need comparing to other samples worldwide.
- A consideration of levels of disability associated with traumatic lesions, and how disability was viewed and treated in the past, would be of value in determining attitudes to disability.

Much remains to be done. However, there is a lot of data already extant in published and unpublished skeletal reports, case and the occasional sample study. However, if work on British material could start from a sound base with established and accepted standardized recording methods many of the recommendations above would be achievable. Population prevalence rates of trauma for age, sex, and status, in geographical, funerary, chronological and cultural context are the key areas for consideration with a clinically based macroscopic and radiographic recording system for trauma, and should be a focus of attention for biological anthropologists working in Britain.

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